

REMARKS/ARGUMENTS

Favorable consideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1, 3, 4, 7, and 9-12 are currently pending in the application; Claim 1 is amended; Claims 2, 5, 6, and 8 are cancelled; and Claims 9-12 are newly added by way of the present amendment. Claim 1 has been amended to incorporate the subject matter of cancelled Claim 2.<sup>1</sup> Support for newly added Claims 9-12 can be found in the application's specification.<sup>2</sup> No new matter is added.

The specification has been amended to add concentric circles as an example of the pattern of the resistance heating element. The concentric circles as an example of the heating element pattern is disclosed in the original Japanese specification, and also supported in the originally filed specification.<sup>3</sup> No new matter is added.

In the outstanding Official Action, Claims 1 and 3 were rejected under 35 U.S.C. § 102 as being anticipated by Hurko (U.S. Patent No. 4,002,883, hereinafter Hurko); and Claims 2, and 4-8 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hurko.

The outstanding Official Action states that it would have been obvious to one of ordinary skill in the art at the time the invention was to modify Hurko's device to include irregularities of 100  $\mu\text{m}$  or less in the conductive strips. Applicants respectfully traverse this assertion.

An exemplary embodiment of the present invention relates to a ceramic heater used to heat a semiconductor producing and/or examining device that is made of a ceramic substrate with a resistance heating element formed on the surface of the ceramic substrate.<sup>4</sup>

Irregularities are formed on the side face of the resistance heating element in order to prevent

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<sup>1</sup> Application at page 3, lines 1-16 and Figure 4.

<sup>2</sup> Claim 9 at page 3, lines 13-14. Claim 10 at page 12, lines 8-15. Claim 11 at page 11, lines 34-35. Claim 12 at page 11, lines 30-33.

<sup>3</sup> Application at page 13, lines 25-26.

<sup>4</sup> Application at page 2, lines 11-16.

exfoliation of the resistance heating element.<sup>5</sup> Exfoliation (separation from the ceramic substrate) of the heating element from the substrate results when there are variations in temperature across the surface of the hot plates. Thus, the present invention introduces irregularities in the heating element so that the temperature of the entire heating surface remains more constant compared to that of the prior art devices and exfoliation of the heating elements from the substrate is limited.<sup>6</sup> The variation of the peaks and valleys of the wave-like irregularities cannot be too large, however, if undue heat radiation is to be avoided.<sup>7</sup>

Amended Claim 1 recites, *inter alia* a ceramic heater for a semiconductor producing/examining device, comprising:

“...a resistance heating element formed on the surface of said ceramic substrate,  
wherein irregularities are formed on side face of said resistance heating element, and  
said irregularities on the side face having a variation between maximum and minimum points of 100  $\mu\text{m}$  or less.”

Hurko describes a conventional stovetop cooking device including a glass-ceramic plate (10) and conductor loops (12) with the conductor loops (12) being formed as sine-wave curves.<sup>8</sup> The purpose of the sine-wave construction of the conductor strips is to compensate for the potential failure of one of the strips; upon failure of one of the conductive elements the distribution of sine-wave-shaped elements provides a better distributed supply of heat than other designs.<sup>9</sup> Since Hurko's device is used for cooking food, and the sort, his device is described as being 6 inches in diameter and having coils that are 1.23 inches wide, and 15 inches long.<sup>10</sup> There is no hint in Hurko of optimizing the peak and valley variation of the

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<sup>5</sup> Application at page 2, lines 17-35.

<sup>6</sup> Application at page 26, lines 4-21.

<sup>7</sup> Application at page 3, lines 1-8.

<sup>8</sup> Hurko at column 6, lines 16-18.

<sup>9</sup> Hurko at column 6, lines 11-24.

<sup>10</sup> Hurko at column 5, lines 57-59.

sine-wave to prevent exfoliation. The case law requires the prior art to suggest the nature of the result to be achieved as to optimization if an optimization rationale is used, as it is here.<sup>11</sup>

Furthermore, the basic requirements for a *prima facie* case of obviousness are (1) there must be some suggestion or motivation in the references themselves or in the knowledge generally available to one of ordinary skill in the art to modify the reference or to combine the reference teachings, (2) there must be reasonable expectation of success, and (3) the prior art reference must teach or suggest all the claim limitations. It is respectfully submitted that the outstanding Official Action fails to make a *prima facie* case of obviousness, because there is no suggestion or motivation to modify the reference, and Hurko clearly teaches away from the Applicant's invention.

Claim 1 of the invention recites that "irregularities" are formed on the side face of the heating element and that these irregularities have an amplitude of 100 $\mu$ m or less. As seen in the figures, the irregularities allow the heating elements to have a wave-type structure.<sup>12</sup> This structure promotes heat distribution and prevents the heating elements from exfoliating from the ceramic substrate. It is also to be noted that the heating elements in the claimed invention are typically in the range of 2.4mm in width.<sup>13</sup>

Conversely, Hurko describes heating elements that are 1.23 inches in width and visibly shaped as a sine-wave in an effort to compensate for the potential loss of one of the heating elements.<sup>14</sup> In Hurko's device, the irregularities created by the sine-wave shape clearly have an amplitude that is larger than 100 $\mu$ m. Thus, implementing conductive coils with irregularities less than 100 $\mu$ m (sine-wave amplitudes of less than 100 $\mu$ m on a 1.23 inch coil) in Hurko's device would result in Hurko's device being constructed of a series of

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<sup>11</sup> In re Antonie, 559 F.2d 618, 620, 195 USPQ 6, 8 (CCPA 1977).

<sup>12</sup> Application at Figure 4.

<sup>13</sup> Application at page 24, lines 19-24.

<sup>14</sup> Hurko at column 6, lines 11-30 and Figure 1.

concentric conductive circular coils. This concentric circle design is one of the prior art design that Hurko's invention intended to improve upon.<sup>15</sup>

Thus, based on the size of Hurko's device, there is no motivation or expectation of success that creating irregularities smaller than 100µm would in any way improve his design.

Furthermore, Hurko is non-analogous art as it teaches away from the invention by describing designing sine-wave-shaped conductive strips as a way of mitigating the effect of damaged conductive strips. Hurko describes that the change in temperature distribution caused by a failure of a strip would not be noticeable because of the symmetrical (sine-wave) pattern of the strips, as compared to a conventional circular pattern.<sup>16</sup> This objective is in clear contrast to the objective to be achieved by the present invention. The irregularities on the conductive strips, as recited in Claim 1, are provided to at least prevent exfoliation of each of the conductive strips, not to mitigate the damage of a strip. In this manner, the irregularities on the conductive strip as presented in the claimed invention are used to prevent failure, not to mitigate the effects of a failure.

Thus, Hurko's conductive strips implement sine-wave patterns in order to compensate for the failure of a conductive strip, but in the claimed invention the irregularities are presented in order to actively prevent the failure of the conductive strips.

"A reference may be said to teach away when a person of ordinary skill in the art, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant." *In re Gurley*, 31 USPQ2d 1130, 1131 (Fed. Cir. 1994). To this end, "disclosures in the references that diverge from and teach away from the invention cannot be disregarded", Phillips Petroleum Company v. U.S. Steel Corp., 9 USPQ2d 1461 (Fed. Cir. 1989).

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<sup>15</sup> Hurko at column 1, line 28-column 2, line 36.

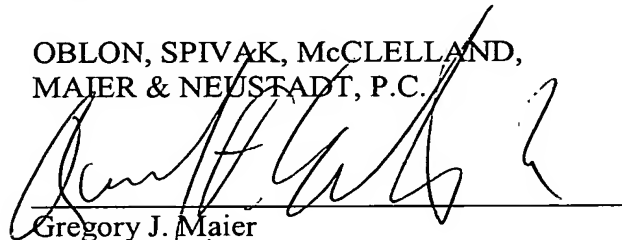
<sup>16</sup> Hurko at column 6, lines 11-30.

Accordingly, it is respectfully submitted that amended Claim 1, as well as dependent Claims 3, 4, 7, and 9-12 patentably define over Hurko.

Consequently, in view of the present amendment and in light of the foregoing comments, it is respectfully submitted that the invention defined by Claims 1, 3-4, 7, and 9-12 patentably distinguishes over the prior art. The present application is therefore believed to be in condition for formal allowance and an early and favorable reconsideration of the application is therefore requested.

Respectfully submitted,

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